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ABSTRACT

The growing convergence of research library functions with a knowledge network infrastructure is beginning to have a transforming influence on the conduct of university research and instruction. Computing and communication network technologies are forcing a re-examination of institutional missions, the policies that support knowledge transmission, research productivity, scholarly communication, academic creativity, intellectual property ownership, and the values supporting intellectual inquiry, quality, and advancement within the university. These structural shifts are occurring within a dynamic context of organizational change. Greater awareness of the influence of electronic machines on learning will present new structures for the education of tomorrow's students, who will encounter interactive multimedia technology in conjunction with more traditional textual resources. Faculty members will use computer and audiovisual technology together to create course materials mixing film, video, graphics, sound, and text. More research is being performed by teams of specialists, often working in collegial networks or co-laboratories, and research libraries are moving towards networked information systems and access to shared resources from diverse collection sources. Those involved in these changes must engage in a rigorous exploration of the impact on professional and institutional values so that the changing infrastructure will reflect the creative systems, established conventions, scholarly customs, and social structures required to perpetuate the values of the scholarly community into the next century. (KRN)

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The University of Illinois at Chicago 1991 Yuri Nakata Lecture October 11, 1991 "Knowledge Communities and Information Network Policies"

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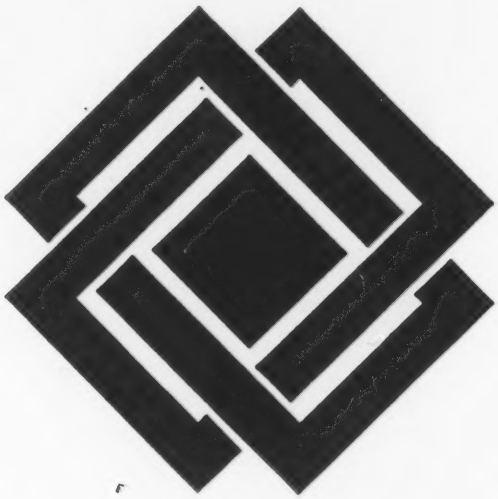

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I. Introduction

It is both a personal pleasure and a professional honor to be with you this afternoon. The topic I have selected for this, the twelfth Yuri Nakata Lecture here at the Library of the University of Illinois at Chicago is a logical continuation of the topics addressed in this lecture series. The previous lectures, on the whole, reflect concern about future directions for the conduct of research and the influence of networks on the mission of information organizations in the academic environment.

I am pleased to be able to continue this tradition. My topic explores the growing convergence of research library functions with a knowledge network infrastructure. This convergence is beginning to have a transforming influence on the character of scholarship and will have a profound impact on the conduct of university research and instruction in the near future. In essence, my topic reviews the policy implications of the new knowledge communities through which the creation, structuring, representation, dissemination and use of scholarly and scientific information is changing in response to the application of computing and communication technologies.

Yesterday's Symposium on Information Exchange in Academe was organized to celebrate the remodeling of the Main Library. These architectural modifications include newly designed space for information services and for the library's collections. These recent changes reflect a strong professional commitment to service and support of scholarship. They are characteristic of a tradition representing the progressive academic library and the modern research university over the last century.

My lecture this afternoon also explores another form of "major remodeling": a reconceptualization of the scholarly communications infrastructure. This major redesign is concerned with fluid social relationships and intellectual links more than with static spacial structures. The "major remodeling" of my topic involves a significant structural redesign of the communication and culture implicit to the emerging global "knowledge community."

There is evidence that a restructuring of the knowledge communications infrastructure will have a fundamental impact on our educational, research, and informational institutions. It is affecting the communication customs, habits, and

expectations of scholars, scientists, researchers, and academic librarians. In effect, the changes are affecting the entire information transfer cycle from the creation, structuring, and representation of information to its dissemination and use by of the members of our collegial knowledge communities.

This restructuring of the knowledge communication system may appear more conceptual than physical at present, but the computing and communication network technologies that are redesigning the collective behavior of our scholarly communities are forcing a re-examination of our institutional missions, the policies which support knowledge transmission, research productivity, scholarly communication, academic creativity, intellectual property ownership, and the values supporting intellectual inquiry, quality, and advancement within the university.

These structural shifts are occurring within a dynamic context of organizational change. Our institutions of higher education are presently at work redefining their functions and missions. This process had its origins in the nineteenth century when graduate study was appended to the basic undergraduate curriculum. The expansion of graduate level coursework required additional, expanded services, resources, and facilities to support advanced degree and research programs. At the time, equal priority was given to the university's tripart social role in teaching, research, and service. Twentieth century growth and development of the modern "multiversity" was based on this balanced mission model. As long as program expansion was fueled by government support and, as long as universities continued to receive strong social endorsement, pressures for change served as the basis for progress and expansion.

In this lecture, I am going to talk about the changing paradigms of learning, the university, research, the academic library, computer networks, and the knowledge network community. To those of you who, like a former boss of mine at the Library of Congress, have a particular aversion to the use of this term, I apologize. For the rest of us, I invite you to count with me the number of times the word is used this afternoon.

I know that to some members of the academic community all this talk of changing paradigms sounds like Chicken Little's warnings about the sky falling. From numerous conversations over the past several years, my notions of changing scholarly communication paradigms have been challenged by librarian, faculty, and publisher colleagues who do not see these changes reflected in their work. Some in the academic and research communities who have dedicated their professional lives and careers to teaching, writing, and research have seen little evidence of technology's influence on their work beyond the replacement of the typewriter with the word processor.

From my vantage point, however, mountains of evidence indicating paradigm shifts have shaped my perspective on the future. I am compelled by this overwhelming evidence to share a view of the present in which subtle but important

shifts in customs and expectations are evident. These shifts, I am convinced, will ultimately change the nature of our academic institutions and the nature of the partnerships between scientists, scholars, and librarians. The changes will not come all at once. But an indication of the magnitude of the changes can be seen in the evolving relationship between the university computer center and the campus library system over the last decade.

My objective this afternoon is to create enough of a doubt in your minds about the future of the university research enterprise and scholarly communications that you will engage in your own rigorous exploration of the impacts of change on our professional and institutional values. This must be done in order that the changing infrastructure will reflect the creative systems, established conventions, scholarly customs, and social structures required to perpetuate values of the scholarly community into the next century.

II. Paradigm Changes in Learning

The clear lesson from the last two decades of change is that the institutional mission of the academic library does not depend upon the same static scholarly information structures which were in place a few short decades ago. Rapid changes in academic libraries reflect the changes affecting their parent institutions as a whole. Colleges and universities, however, are changing in response to social and cultural shifts which are forcing a re- examination of our institutional, personal, and political priorities, policies, and values.

The industrial revolution of the last two centuries was characterized by machines that extended and leveraged human physical capability. We are now in the early stages of another, similar revolution, no less pervasive than the industrial revolution. This paradigm shift involves the extension of our mental and communication abilities by the use of intelligent machines connected together through information networks.

The networked age is not a simple extension or latter stage of the industrial revolution. Network extension of computer capabilities presents exponentially different concerns. The industrial age depended upon access and availability to natural resources and labor. The more recent age of networked information depends upon access to and availability of knowledge resources by intellectually creative communities. The first development is physical, the second is more properly identified as mental.

Just as the first industrial revolution has fundamentally affected our vision and definition of the world, so also, the second revolution is altering our vision of reality. The decreasing emphasis on material resources and human labor is having a profound impact on the nature of global competitiveness and economic success.

The shift of focus and attention from material goods to ideas and access to knowledge involves a sweeping change in the ecology of human cognition. Also, almost as a by-product of the application of powerful information processing and network tools to traditional educational, research, and communication functions, we expose questions related to the fundamental, complex properties associated with the ability of humans to learn and communicate.

Our understanding of the way learning occurs has structured our schools and educational institutions in very specific ways over the last two centuries. These learning models are largely assumed to be accurate. However, each time that a new technology is applied to the teaching and learning processes, we encounter questions related to the fundamental principles and methods through which knowledge is generated and passed within communities. Greater awareness of the influence of electronic machines on the way learning is acquired, classified, made available and exploited will present new structures for the education of tomorrow's students in learning environments that may be radically different from today's classrooms, libraries, and laboratories.

Many new technology-based systems for education emphasize learning, rather than the teaching process. Hypermedia, for example, creates an environment in which exploration and discovery may flourish, without the direct involvement of instructors or teachers. By allowing learners to move through non-linear structures, new approaches and integrations are possible that are impossible in more traditional, structured, deliberate, and explicit learning situations. Technology provides a more implicit, incidental learning experience prompted by self-determined exploration of an unknown landscape. Implicit in the newer learning resources is the fact that students can interact with the materials at times, in places, and in ways that are much less structured than the traditional classroom, the lecture hall, or the library.

Student directed learning, allowing open investigation of a complex topic from a number of differing approaches, appears to provide a richer and more personally directed educational experience through unmediated interaction with learning resources. In these newer learning systems, the student encounters information through many alternate paths. The learning experience produces a result that allows the information to be used in many different ways.

This approach to mastering material is particularly suited for those topic domains involving complex problems of an interdisciplinary nature. Increasingly, we are encountering complex problems that require personally directed creative thinking to arrive at solutions. Learning in these complex problem areas requires tools to navigate in woven and interconnected domains where following single connecting threads does not produce useful results.

Technology is forging a new paradigm for learning that will have a restructuring influence on education in the next decade. The lessons are critical for

the directions that the university will move in the future.

A. Changing University Paradigm

The mission of the research university is changing in response to the adoption of new electronic technology. Symptoms of change are to be found in the conduct of today's research and in the transition to the wired campus of the future, as well as the computer-equipped classroom of tomorrow. Students of tomorrow will encounter interactive multimedia technology, in conjunction with more traditional textual resources. Faculty members will use computer and audio-visual technology together to create course materials mixing film, video, graphics, sound, and text. Students do not have to be physically present in the classroom to participate in the learning experience.

For example, students will soon be able to view various interpretations of dramatic scenes or interactively explicate the historical context of a particular phrase or poem such as "Ulysses". In another application, students can explore Mayan ruins or the detail of Michelangelo's Pieta using a system employing the photographic realism of high definition color image display, videos of scholarly lectures, and systems which enable the student to interact with resource material in a more direct and realistic way. This "virtual reality" has a profound influence on what is learned, as well as on how the material is delivered and presented.

The next decade will bring dramatic changes resulting from a transition away from the manufacturing of print products towards the distribution of instructional and scholarly information in a variety of media formats. The use of printed text on paper has served as a paradigm for information in the past, but this is changing rapidly as technology expands the choice of media. I can choose from a variety of different ways to communicate messages: I can send a letter, make a telephone call, send a message by electronic mail, send a fax, talk face to face, write scholarly journal articles, publish a scholarly monograph, compose a newsletter note, deliver a classroom lecture, attend a professional conference presentation, show a video, play an audio tape, post messages on network bulletin boards, etc. Each media choice involves a different message and a different learning experience. Each involves a cultural message component as well as specific content meaning. In the future, our choice of expression of the message content and format will have a critical impact on those who receive the communication.

It is interesting to note that, in the early stages of development, computers and humans are good a different tasks. For example, computers at a very basic functional level, are excellent at performing rapid and complex numeric calculations; humans, on the other hand, are good at learning through images, icons, or pictures. As digital computers have matured over the last two decades, they have gradually begun to incorporate both numbers and images. As humans develop their learning skills, we move from images to words, and, finally, to more quantitative mathematical expressions of logic and reasoning. In our evolution towards a more

integrated human-machine learning environment, we are beginning to recognize the cultural and social aspects of technology integration.

The integration of hypertext applications, for example, into instructional systems permits an interweaving of different materials at several levels of difficulty that can be approached by students of varying levels of academic accomplishment. Such technology integration allows students to discover connections between contextual material of widely varying natures (video, text, audio, mathematical) and to integrate the subject materials of a single course with other courses. Students can arrive at a quicker and easier understanding of the culture of a discipline in a way that makes materials available as they are needed, not as scheduled lectures that must be attended sequentially.

Our choice in the near term future, is not whether we accept or disagree with the incorporation of technology-based systems in higher education. It is rather, how we will shape and use the tools made possible through electronic technologies for use in accomplishing the historic mission of the university.

B. Changing Research Paradigm

These changes in the way we integrate technologies into scholarly systems reflect the changing nature of relationships in the higher education, research, and teaching communities. The following points provide an indication of some interrelated trends in the conduct of research and identify a few implications of these changes on the missions of university libraries:

1. Much research is becoming increasingly analytic. This trend results in a greater concentration on quantitative information and data, rather than a dependence on the published results of research. Demand for the data supporting the research conclusion is increasingly important in a number of disciplines.

2. More research is performed by teams of specialists, often working in collegial networks or co-laboratories which span the globe. The consequence of this trend is a greater use of informal reports shared among peers in the "invisible college" and a greater reliance on the data produced by prior studies, rather than full published research outcomes.

3. Research is increasingly directed toward solving a specific problem, rather of a more fundamental or basic nature. This application-orientation places less emphasis on performing an exhaustive review of the published literature, especially if solutions can be developed without the investment of time spent researching the literature reporting the results of prior investigations.

4. The growing volume of research literature increases the difficulty of managing information, interpreting data, and filtering massive volumes of research.

5. Research incentives (especially in the scientific, technical, and medical fields) are increasingly competitive in nature, especially when federal government grants are involved, but also with international awards and private support of university-based research programs.

6. Research is increasingly specialized, with branching and "twigging" often occurring for fields which are sub-sets of other specialized areas. These twig fields require specialized literature support for practitioners.

7. Research is increasingly cross or inter disciplinary requiring researchers to draw from near or allied, or even non related subject literature in order to obtain relevant information in support of team activities.

8. Access to published research by non-research-oriented students is increasing. Even high school students, as well as undergraduates and non-institutional researchers are demanding access to scholarly articles.

9. The costs of performing research are increasing and are beginning to threaten those institutions which have been both the leading research and teaching universities. If these schools can only afford to perform research, the medieval model of the university may be history.

These changing trends in research are reflective of the changes which are occurring in the academic community. As the pressures for change continue to mount, the university's response will increasingly involve a modification of the communication infrastructures and customs which link the members of this community together. In order to place these communication changes in context it is helpful to review the changes which are occurring in the academic library paradigm.

C. Changing Academic Library Paradigm

Symptomatic evidence of our current academic library transitional environment are commonly accepted to be trends such as the following:

1. Increasing involvement of digital electronic systems in library and scholarly information organizations;

2. Movement towards networked information systems and a shift away from resource ownership toward access to shared resources from diverse collection sources;

3. Shift towards a more fluid format where information is available in a

multiple array of formats, both graphic and digital;

4. Shift towards greater user choice and control of the form and content of information and away from system constraints;

5. Rapid changes towards a global perspective on information issues, especially in acquiring scholarly information resources from non-domestic sources of supply;

6. Increasing proliferation of information production that necessitates an increase in the ability to process and manage information at an ever increasing level of efficiency;

7. Concern about the social and economic impact of information illiteracy and electronic illiteracy;

8. Growing concern over the economic consequences and property ownership implications of a transition from our graphic print-based information society to a culture dependent upon electronic communication as a means of information transfer and exchange;

9. Increasing concern about individual privacy and confidentiality, especially in relation to personal information and to issues involving individual information selection and choice;

10. Increasing involvement of different teams or groups of individuals engaged in collaborative work using information technology which bridges time and geographic distance allowing cooperative group intellectual research and problem solving;

11. A growing awareness that the transition to a new library paradigm requires a careful examination of the inherent values underlying the information creation, exchange, and sharing process.

D. Changing Computer Network Paradigm

We are currently in the midst of a shift from desktop to network computing. The movement involves a change in thinking about the computer as an isolated productivity tool, towards seeing the active integration of computational devices in the acquisition, use, and creation of information, as well as tools for facilitating human communication and interaction. Computers that collaborate with their users are developing where the machines function as agents supporting more mobile and interactive needs that emphasize facsimile and speech, in addition to numbers, images, and text.

Current discussion in the information processing and communications industries now centers on the integration of multi-media into computing platforms, the decentralization of processing power and files across different machines where servers and clients interact in networks linking general and special purpose machines together, and the use of computer supported collaborative software work tools which enable different groups to work in close conjunction brought about by nearly universal connectivity.

Networked organizations are now emerging which present new models that challenge our older concepts of time and place. Networks have the potential for changing the nature of the overall work and educational environments, and of changing the conventional patterns and expectations of who talks to whom and who has access to what knowledge.

One of the surprising things that we are learning from our limited experience in understanding the impact of networks on human communications and culture, is that people often use technology in surprising and unintended ways that are not always predictable. Network users of the packet-switched ARPANET (U.S. Advanced Research Projects Agency Network) which began in the 1960's found that this link between computer scientists at universities and other research institutions to distant computers was actually a more effective means of electronic mail between participants around the country.

Another interesting phenomenon associated with the evolving network culture involves a situation described in Clifford Stoll's 1990 book: The Cuckoo's Egg: Tracking a Spy Through the Maze of Computer Espionage (Doubleday, 1990). In this fascinating chronicle of an actual break-in of the U.S. military computer network, Stoll tracks a $.75 discrepancy in accounts of the computer department of Lawrence Berkeley Laboratories in 1986, to the world of international espionage and, ultimately, to a hacker in Hamburg, West Germany, who uses government networks to break into thousands of military and university computers seeking secret information that would be of interest to the KGB. Stoll's tale points out the security, trust, and privacy concerns raised by the use of communications networks.

III. Changing Knowledge Network Community Paradigm

The changing paradigms of the university and the academic library of the next century are influenced by the integration of computers and the networks that interconnect them. Futurists identify a vision of the future built on information technology which will enrich human life by improving the way we live, learn, and work. The enrichment is achieved through the development of an information infrastructure that increases personal potential and social freedom. With this increased freedom, however, comes a sense of responsibility. Our Knowledge Communities require that we develop the technical procedures and the cultural

controls which ensure effective and productive "intellectual" traffic on these neural high-speed interstate highways of the mind.

How will this networked future provide the promised benefits? How can our evolution towards a more interconnected and humane future deliver the benefits and minimize the possibility of a more dehumanized, isolated, and confusing existence for citizens, students, workers, and educators? Will we as information professionals be able to interpret and evaluate an increasing mountain of jumbled, confused, and often irrelevant information? And, finally, how can we as professional librarians find a meaningful and productive role for ourselves in a future infrastructure where our skills, talents, and values are integrated with the ability of machines to "...intelligently handle some of the dazzling diversity of concepts that information represents." (Michael L. Dertouzos writing in an article entitled "Communications, Computers, and Networks" in the Scientific American, Sept. 1991, p. 64.) Finding our place requires an examination of the changes in the nature of community.

A. Changing Nature of Community

Our notions of a community as a body of individuals with common interests living in a defined physical space or a specific geographical area is no longer consistent with reality. A community is becoming place independent. Common interests and traits play an increasingly dominant role in determining the interactions among community participants regardless of location, institutional affiliation, or individual specialty.

For some, the most important basis of commonality is common territory. Increasingly, this territory is conceptual "cyberspace" which, as John P. Barlow, computer activist and co- founder of the Electronic Frontier Foundation has indicated: "...remains a frontier region across which roam the few aboriginal technologists and cyberpunks who can tolerate the austerity of its savage computer interfaces, incompatible communications protocols, proprietary barricades, cultural and legal ambiguities, and general lack of useful maps or metaphors." (Branscomb, Anne W., "Common law for the electronic frontier." in Scientific American, Sept. 1991, p. 154.)

Communities are, by definition, social constructs built upon common interests and participation. Common ties and a sense of belonging may derive from beliefs in a common past or a common fate, common values, or subject interests. The inherent common interest among the members of a community provides the motive for both the initial formation of a community and the continued bonding of participants. As a result of forming a community, structures, customs, and shared expectations arise to satisfy a human need for order, consistency, fairness, and effectiveness. Community members are distinguished from those not a part of the group by access to information and knowledge.

A scholarly or scientific community consists of the practitioners of an academic specialty or series of interrelated disciplines. Bound together by common elements of education and apprenticeship, the members have a common set of shared goals, among which is the need to train new entrants into the specialty. Professional and academic communities are characterized by the relative fullness of communication within the group and by the relative unanimity of the group's judgement in professional matters. This principle is illustrated through peer review of work prior to publication and by academic status and tenure review groups.

The impact of electronic networks and multimedia learning technologies on the university community affects not only the nature of the resources available to the members, but also the nature of the communication structures upon which the members of the community depend for maintaining the identity and viability of the group.

Changes in the efficiency and effectiveness of the infrastructures supporting the university community are impacting the nature of the relationships between the members of that community. Thus, today's scholarly journal was initially intended to serve as a mechanism for the circulation of professional correspondence among the members of an academic society between meetings. The use of electronic bulletin boards provides an interesting alternative to the scholarly journal article for keeping collaborative project participants informed about the latest findings, events, and gossip.

Our existing web of information infrastructures consisting of digital computers, telephones, networks, broadcast channels, and other established links, functions much like our nation's roads did in the 19th century. Travel by road in the U.S. did not develop effectively until public attention was captured by the personal power and freedom embodied in the automobile. An unintended outcome of the interstate highway system is the formation of "edge" cities which have grown up on the fringes of major U.S. cities and which provide a balanced work, residence, retail alternative to the choice between urban and suburban locations.

Commuters stuck in a traffic jam outside a major city have an excellent opportunity to reflect on the physics of transportation and the nature of the community created by the interstate highway system. We have devoted a considerable amount of energy, time, and talent to evolve a way of life based on the continual movement of people and objects from one place to another. What we did not do in our national community dialogue is identify at the outset what the consequences of building an interstate highway system would be on the environment, on the railroads, on our dependence on imported fuels, and on the suburban commuter struggling to travel to and from a job in the inner city.

As we develop the new digital interstate highway system for knowledge communication networks we must engage in a national community dialogue about the consequences of such a network system on the nature of our public and private

communities, especially on those communities of higher education which depend upon the network's interactions and links to maintain the values and quality of scholarship.

IV. Toward Future Knowledge Network Policies

Emerson warned us to "...beware of what you set your heart on, for you may get it." The U.S. academic library and university community has set it's heart on implementing the National Research and Education Network Act. We have a concept in mind which involves connectedness, community, and collaboration through a high speed, high capacity interstate digital network. My talk this afternoon has focused on describing some of the affects of shifting paradigms on the nature of the policies of our academic libraries and universities.

Historically, the promise of new technologies and knowledge formats has often been limited by existing concepts that limited the application of new tools and technologies. The printing press was thus used initially to produce imitations of handwritten manuscripts for monastic libraries, before print was introduced as mass media tool for distribution. Similarly, today's culture employs network systems as if they were simply extensions of the printed text, instead of exploring the fuller potential of the digital medium for multimedia applications. We thus find suggestions for incorporating peer review mechanisms and editorial review board functions into electronic journal articles. The questions that we need to be asking ourselves concern the expanded capabilities of the network media for amplifying scholarly interaction and communication, as well as how we can use networks to improve our existing activities. Carrying over old structures into newly created environments does not always produce the best results.

The electronic environment of computer networks is marked by versatility, complexity, diversity, and intangibility. Most of our society's traditional rights, customs, and freedoms result from a social, legal, and political environment that is defined by constraints of physical space and temporal proximity. Just the problem of talking about the nature of information on a network presents problems. The fluidity of the network makes it difficult to know which version of a document we are talking about, whether it is the draft, a review copy, or a "published" copy. The diversity of different environments makes it difficult to identify who is the author, the reviewer, the editor, the publisher, the republisher, the reader adding interactive annotations, or archivist.

Not only do networks stretch our print-bound delineation of roles, they also expose the limits of our policies. The policy areas of concern to the emerging network include intellectual property law, social policy, and regulation of communications. Our social laws and customs result from an industrial era with different priorities and parameters than those common to the emerging knowledge network community.

There are three specific policy areas related to academic and scholarly network rights and freedoms that I want to talk briefly about. These areas are: 1.) Ownership of Knowledge; 2.) Public Networks and Privacy; and 3.) Governance and Network Regulation.

A.) Ownership of Knowledge

Perhaps the most vexing of all legal problems concerning a scholarly communications network are questions relating to the ownership of published works. Principles underlying the Intellectual property laws in the print world are difficult for a non-specialist to comprehend. Policies related to the role of third-party rights collectives, in balancing rights and collecting fees paid by users to owners of scholarly works and knowledge properties, assume that the products of network communications will resemble, in large part, those scholarly journal articles which are provided to libraries in printed form at present through annual subscription charges. Thus, much of our professional energies are spent addressing the issues raised by the electronic library and the electronic journal.

The danger is that the network user community will be hard at work inventing the successor to the journal article while we are in the process of trying to devise consistent ways of cataloging, indexing, processing, and archiving electronic network communications. For the academic library community, as for the faculty academic status and prestige system, much of what we are facing with the increasingly ubiquitous use of electronic networking in the scholarly and academic fields, presents new structures which challenge not only our standard processes and procedures, but which force a re-examination of the underlying presuppositions and assumptions of our social structures. Our values and principles require careful examination in light of the rapid changes which our knowledge structures are experiencing.

A new balance is required for the new networks. This balance involves weighing the protection and incentives legally granted to authors and publishers of copyrighted scholarly works against the public demand for widely accessible, fast, inexpensive, and comprehensive dissemination of ideas and research findings expressed in scholarly and research communications and publications. The challenge for us is to find new ways of identifying "fair use" provisions which maintains a balance between protecting the property rights of owners with the access needs of scholars, students, faculty, researchers, and other educational users.

B. Public Networks and Privacy

The members of a community or of a collaborative group who have never met together face to face, but have regular interaction through scholarly communication networks, are likely to have different relationships within the community than those who communicate regularly in many different ways. The

close form of intimacy that is formed through playing "telephone tag" with someone you have never met is an example of this type of different relationship. Similarly, the current news articles about the free-speech rights of students who use academic computer networks to distribute prurient stories, illustrate questions about the nature of appropriate network behavior and relationships.

With 50,000 bulletin boards now available on existing networks, standards of appropriate behavior and expression are left pretty much up to the subscribers and participants. Growth of the national digital network through faster, broad-bandwidth, high capacity digital technologies will rapidly increase the user populations to create a form of an electronic commons in which users can interact doing practically everything they can do in a face to face meeting.

Protection of free speech, free press, and assurance of privacy rights in an electronic environment are not easily achieved. Publicly supported networks that receive tax subsidies will probably be subject to constitutional guarantees. Private networks would, theoretically, not be subject to such rights. The difficulty is in determining when a network is public and when it is private. Already, pieces of the Internet are operated by private corporations in specific geographic regions.

Issues related to the public and private nature of network communications are critical to the scholar and scientist. Editorial review and control provides a critical element of professional validation and authentication. With network communication access, however, our concepts of pre-publication, publication, and post-publication become blurred, as do our concepts of authenticity of authorship. The ease with which electronic impulses can be manipulated, modified, distorted, and erased is problematic for our legal system. International aspects of network access open up questions of differing national legal and regulatory structures which do not present uniform rules.

C. Governance and Network Regulation

In a certain sense, the networks are already taking on public powers as virtually regulated communication carriers. The final governance structure and network regulatory environment which will support a fully integrated operating national network have yet to be finalized. The shape of the network structure and regulations will, however, reflect the policies, customs, and values that lie at the core of this new communications infrastructure. Essentially, the roles and responsibilities of the various public and private sectors in network governance responsibilities will shape the development and direction of the emerging national knowledge networks. Players at present include Congress, Office of Science and Technology Policy, National Science Foundation, Department of Energy, NASA, and NIST. Other players include the commercial networks, the regional telephone companies, and a host of other allied industries and interests representing both the private and public sectors.

The values which are inherent in the evolving knowledge network communities must reflect those freedoms and principles which both inspired and troubled past generations of teachers and librarians. In addition, the new knowledge communities require legal and economic structures, as well as electronic network infrastructures in order to function effectively in fashions that adhere to those value structures identifiable in our democratic way of life.

Academic and intellectual freedoms must surely be translated to function within the boundaries of the new knowledge network communities, just as these freedoms must be redeveloped to form the basis for newly emerging national governments in Eastern Europe and the Soviet Union. The changes occurring in these knowledge and state community domains are not simply economic and political in nature. The changes involve fundamental decisions about how communications must function among individuals in order to respond to new definitions of productivity, accountability, and responsiveness in creating a caring, humane, and civilized world society in the future.

In conclusion, I want to quote extensively from an essay by Gary T. Marx appearing in a publication entitled Citizen Rights and Access to Electronic Information: A Collection of Background Essays Prepared for the 1991 LITA President's Program which was published by the Library and Information Technology Association of the American Library Association (p. 17-18):

"If we are to use emergent technology to best serve human needs in a democratic society, it is important we be on guard against what can be called 'tarnished silver-bullet techno- fallacies'. Following are a number of these information age leaps in logic of which we must be aware, and against which we must guard:

1. The fallacy of assuming that only the guilty have to fear the development of intrusive technology (or, if you've done nothing wrong, you have nothing to hide).

2. The fallacy of the free lunch or 'painless dentistry' in which it is assumed that information technology offers cost-free solutions.

3. The legalistic fallacy of assuming that the only criterion that ought to guide the use of technology is whether or not the law permits it.

4. The fallacy of assuming that pragmatism and/or efficiency should automatically overrule other values such as fairness, equity, external costs imposed on third parties, and symbolic meaning.

5. The fallacy of lowest common denominator morality, in assuming that if the competition or others push moral limits, you are justified in doing the same.

6. cases possessed by an organization is a kind of property, to be brought and sold just like office furniture or raw materials.

7. The fallacy of assuming that because our privacy expectations are historically determined and relative, they must necessarily become weaker as technology becomes more powerful.

8. The fallacy of technical neutrality. (George Orwell's response to the assertion that technology was neutral – 'so is the jungle' – is applicable here.)

9. The fallacy of implied consent and free choice (For example, some phone company officials claim that if you choose to make a call you have consented to have your phone number released. You thus are encouraged to protect your privacy by not using the phone. But that's like saying if you breathe polluted air or drink contaminated water, you consent to these.)

10. The fallacy of believing that because it is possible to successfully skate on thin ice it is acceptable to do so. We should not have to wait for a disaster to occur before concluding that some uses of information technology are simply too risky to be adopted.

11. The fallacy of assuming that the means will never determine the end. There is a danger of starting with the technology and asking what can it be used for, rather than starting with goals and asking how can they best be achieved.

12. The fallacy of perfect containment (or, technology will always remain the solution rather than become the problem.)

13. The fallacy of assuming that if a critic questions the means, he or she must also be against the ends.

With respect to information gathering technology, we are now in the twilight that Justice William O. Douglas wrote about when he argued that the protection of our basic values is not self- executing, and that 'As nightfall does not come at once, neither does oppression. In both instances there is a twilight when everything remains seemingly unchanged. And it is in such twilight that we all must be most aware of change in the air – however slight – lest we become unwitting victims of the darkness.' One could as well argue that we are in a sunrise zone and that we must be aware of change in the air in order to insure that we all profit from the sunshine. But for this to happen, the technology must be bounded by increased pubic awareness, responsible corporate and government behavior, and new laws and policies framed to ensure individual freedoms and protect individual rights."

Thank you very much for your kind attention to these thoughts. I would be

pleased to respond to any questions you might have.